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Disentangling the relationship between mathematical achievement, social skills, and social status in inclusive classrooms

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Abstract

This study examined how the social skills and mathematical achievement levels of pupils in inclusive classrooms relate to their social status. Three achievement groups were compared: $n = 39$ pupils with intellectual disabilities (ID) and very basic mathematical skills, $n = 71$ mainstream pupils with low achievement in mathematics, and $n = 81$ mainstream pupils with high achievement in mathematics. The results show that pupils with ID and low achieving pupils had poorer social skills, were less accepted, and more often rejected than their high achieving peers. Structural equation models indicate that low achievers with poorer social skills were rejected more often than low achievers with better social skills. The greater rejection rate of pupils with ID, however, could not be explained by their lower level of social skills alone. Other factors which may have affected the social status of pupils with ID and of low achieving mainstream pupils are discussed.

Keywords: social status, inclusion, mathematical achievement, intellectual disabilities, social skills

Die Beziehung zwischen Mathematikleistung, sozialer Akzeptanz und sozialen Kompetenzen von Schüler*innen mit und ohne intellektuelle Beeinträchtigung in inklusiven Grundschulklassen

Zusammenfassung

In der Studie wurde in inklusiven Klassen untersucht, wie soziale Kompetenzen, die Mathematikleistung und der soziometrische Status zusammenhängen. Verglichen wurden drei Gruppen: Schüler*innen mit intellektueller Beeinträchtigung (IB) und sehr basalen mathematischen Kompetenzen ($n = 39$), Schüler*innen ohne IB mit unterdurchschnittlichen Mathematikleistungen ($n = 71$) und Schüler*innen ohne IB mit überdurchschnittlichen mathematischen Leistungen ($n = 81$). Schüler*innen mit IB und mit niedrigen Mathematikleistungen wiesen niedrigere soziale Kompetenzen auf, waren weniger beliebt und wurden mehr abgelehnt als die Lernenden mit hohen Leistungen. Strukturgleichungsmodelle zeigen, dass Schüler*innen mit unterdurchschnittlicher Mathematikleistung stärker abgelehnt

werden, wenn sie niedrige soziale Kompetenzen aufwiesen. Die höhere soziale Ablehnung der Schüler*innen mit IB konnte hingegen nicht allein durch deren niedrigen sozialen Kompetenzen erklärt werden. Es wird diskutiert, welche anderen Faktoren die soziale Ablehnung dieser Schüler*innen zu beeinflussen scheinen.

Schlagwörter: Soziometrischer Status, Inklusion, Mathematikleistung, intellektuelle Beeinträchtigung, soziale Kompetenzen

Pupils with *special educational needs* (SEN) are increasingly being educated in mainstream classrooms and there is evidence that these pupils benefit academically from being enrolled in inclusive settings (Fisher & Meyer, 2002; Freeman & Alkin, 2000; Hardiman et al., 2009; Peetsma et al., 2001; Turner et al., 2008). Specifically, some studies have shown that pupils with *learning disabilities* (LD), language impairment, and *intellectual disabilities* (ID) in inclusive classrooms have greater gains in achievement than similar pupils enrolled in special education settings (Kocaj, et al., 2014; Ruijs & Peetsma, 2009; Sermier et al., 2012).

The social outcomes of inclusive settings for pupils with SEN are not so positive. Pupils with SEN are less accepted and more often rejected. They are less likely to be chosen by peers as play partners, seat neighbors, friends, interaction partners, or working partners and are more likely to receive low acceptance ratings than their classmates without SEN (Avramidis, 2013; Bossaert et al., 2015; Huber & Wilbert, 2012; Krull et al., 2018; Koster et al., 2010; Schwab et al., 2015). To preclude this widespread social rejection of pupils with SEN in inclusive classrooms, the factors that are significantly correlated to the social status of pupils within their peer group, especially those that affect pupils with SEN, need to be identified.

Empirical evidence suggests that the low academic achievement level of pupils with SEN might be related to their social status in mainstream classrooms (e.g., Huber & Wilbert, 2012; Nowicki, 2003; Walker & Nabuzoka, 2007). In school, academic achievement is important. The teachers' primary

task is to provide learning opportunities so that pupils make academic achievement gains. But not all pupils perform equally well, and differences in academic achievement can be apparent to peers because of teaching practices. In particular, grouping academically similar pupils for instructional purposes or fostering competitive structures can have a negative impact on social participation (Juvonen et al., 2019). As a result, pupils who perform well academically are more likely to be accepted and low achieving pupils are more likely to be rejected by their peers (e.g., Huber & Wilbert, 2012; Nowicki, 2003; Walker & Nabuzoka, 2007). Therefore, pupils with ID, who can only attain very low academic achievement levels, might be at greater risk of being more rejected and less accepted than pupils with other types of SEN and pupils without SEN (Santich & Kavanagh, 1997; Scheepestra et al., 1999).

Other factors associated with the social status of pupils are their social behavior and social skills. Pupils who exhibit problematic social behavior and lack social skills are less likely to be accepted by their peers (García Bacete et al., 2017; Perren & Alsaker, 2009). The relationship between low social status in the peer group and low levels of social skills in pupils with SEN has also been established in several studies (Frederickson & Furnham, 2004; Henricsson & Rydell, 2006). One common assumption is that poor social skills might make it difficult for pupils with SEN to have positive interactions with peers, thus making them vulnerable to rejection and exclusion (Avramidis, 2010; Krull et al., 2018; Pijl et al., 2008; Schwab et al., 2015). The relationship between so-

cial skills and acceptance may also vary depending on the type of SEN (e.g., Frostad & Pijl, 2007). According to a review by Schoop-Kasteler and Müller (2020), pupils with ID face specific challenges in building and maintaining social relationships, thus making these pupils more likely to have low social status within their peer group.

The present study is an attempt to analyze the relationships between three factors in pupils with and without ID – (a) academic achievement, (b) social skills, and (c) social status in the peer group – in order to understand what makes some pupils more accepted and less likely to be rejected than others. The study was carried out in inclusive classrooms which were attended by pupils with ID. Inclusive classrooms generally have high levels of academic and social heterogeneity, making them very suitable for examining these relationships. Three groups which were defined by different mathematical achievement levels were compared: mainstream pupils with low mathematical achievement, mainstream pupils with high mathematical achievement, and pupils diagnosed with ID. Pupils with ID are characterized as having significant limitations in both intellectual function and adaptive behavior (American Psychiatric Association, 2013), and their mathematical competence often does not progress beyond basic numerical skills (Faragher & Clarke, 2014). Therefore, it is especially interesting to analyze the relationship between mathematical achievement, social skills, and social status in inclusive classrooms attended by pupils with ID, and compare this group with mainstream pupils with low mathematical achievement but no SEN diagnosis and mainstream pupils with high mathematical achievement.

The relationship between social status, academic achievement, and social skills

According to research on pupils' social status in the peer group, being well liked or highly accepted by peers is not necessarily linked to being popular in the peer group (van den Berg et al., 2020). Being accepted and well liked differs from a newer definition of perceived popularity which is characterized by reputation and dominance within the group. Whereas, pupils who are perceived as popular by peers are not always nice or well liked, being highly accepted and well liked has been linked to having better social skills and more friends (Newcomb et al., 1993), and can have a positive effect on a pupil's social adjustment (Cillessen & Rose, 2005; Wentzel, 2003). Inversely, experiencing social rejection can elevate the stress levels of the affected individuals (Peters et al., 2011). Being constantly subjected to rejection by peers can result in a decrease in class participation (Ladd et al., 2008) and thus also have a negative impact on the social self-concept and the socio-emotional development of the affected pupils (Gifford-Smith & Brownell, 2003; Salmivalli & Isaacs, 2005). Studies conducted in several countries that have looked at pupils with a variety of SEN have consistently found that these pupils experience social rejection more often and are less accepted than their classmates without SEN (Avramidis, 2013; Estell et al., 2008; Grütter et al., 2015; Krull et al., 2018; Pijl et al., 2008). This puts them at a greater risk of feeling distressed, being less involved in class activities, and developing a low social self-concept, as well as having more behavioral problems than their typically developing classmates. The reasons for peer rejection of pupils with SEN need to be examined in greater detail. The focus of this study is on pupils with ID enrolled with mainstream pupils in inclusive classrooms. However, because research on the social status of pupils with ID in inclusive classrooms is scarce, we have also

included research results on other groups of SEN-pupils with low academic achievement levels.

Academic achievement and social status

Reporting the results of previous research on the relationship between social status and academic achievement in inclusive classrooms is challenging because there are many ways to operationalize achievement: SEN-status, achievement tests, grades, or teacher-rated special educational needs. This is further complicated because some studies use multiple methods to measure achievement.

There is evidence that academic achievement is linked to social status (see Nakamoto & Schwartz, 2010). A meta-analysis by Nowicki (2003) indicated that pupils with LD were more at risk of social exclusion than their average- to high-achieving classmates. However, both pupils with LD and low achievers had lower scores for social measures than their peers with average- to high-achievement and were therefore at risk of social exclusion. Huber and Wilbert (2012) found that pupils with low grades who required a high level of special education support reported lower levels of social inclusion and felt less accepted by their teachers than their peers. Walker and Nabuzoka (2007) compared the social status of pupils with LD aged 7 to 12 with that of high and low achieving pupils. High achieving pupils received significantly more nominations for "most liked" than pupils with LD. Pupils with LD received the most nominations for "least liked" (indicator for rejection). Assessments for acceptance and rejection did not differ significantly between low achieving pupils and pupils with LD. Similar results were found in a study by Van der Sande and colleagues (2018). The perceived academic reputation of fifth-graders was positively correlated with likeability and perceived popularity; the higher the perceived academic achieve-

ment level of a pupil, the better liked by peers and the greater her/his perceived popularity within the peer group. Having a high academic achievement level has also been found to increase a pupil's probability of being selected by peers for collaborative work (Garrote, 2020). Taken together, these findings suggest that academic achievement and social status are related. Thus, it can be assumed that pupils with SEN, who have lower academic achievement levels than most of their peers in inclusive classrooms, are at a social disadvantage in their peer group. This might be especially true for pupils with ID, because their academic skills, especially their mathematics skills, are often less advanced relative to those of their peers (e.g., Faragher & Clarke, 2014; Patel et al., 2020). However, there is a lack of empirical research supporting this assumption.

Social skills and social status

Social skills are crucial for social interactions and forming relationships with peers (Fabes et al., 2009; Henricsson & Rydell, 2006; Rubin et al., 2015). A lack of social skills can hinder a child's socialization and thus prevent them gaining peer acceptance (Bellini et al., 2007; Henricsson & Rydell, 2006; Malti & Perren, 2016). Malti and Perren (2016) differentiate between self-oriented and other-oriented skills. Self-oriented skills aim to satisfy individual needs and include initiating and maintaining social interactions, leadership skills, and the ability to set limits with peers. Other-oriented social skills, such as helping, caring, and cooperating, are based on considering the interests and benefits of others in social interactions. When studying the link between the social status and social skills of pupils with SEN in inclusive settings, other-oriented social skills, such as cooperative and prosocial behavior, are usually assessed (e.g., Frostad & Pijl, 2007; Jones & Frederickson, 2010; Schwab et al., 2015). While Frostad and Pijl (2007) found only a weak relationship between cooperative behavior and social ac-

ceptance, research by Schwab et al. (2015) showed a relationship between low levels of self-reported inclusion and low levels of prosocial behavior in pupils with SEN. Fredrickson and Furnham (2004) reported that rejected pupils with LD had lower levels of positive social behavior than popular pupils with LD. Unfortunately, there is a lack of research focused on the relationship between social skills and social status in pupils with ID. An analysis using the same sample used in this study revealed that social skills were related to social status in mainstream pupils but not in pupils with ID (Garrote, 2017). For pupils with ID, the social skills of the rejected pupils did not differ from those of the accepted pupils. In sum, the results on the relationship between social skills and social status are inconclusive. Further in-depth analyses including further variables (e.g., academic achievement level) are required to better understand the relationship between these factors.

Academic achievement and social skills

Research also suggests that there is a relationship between academic achievement and social skills. Peers rate high achieving pupils as more popular and as displaying more positive social behavior than low achievers or pupils with LD (Walker & Nabuzoka, 2007). When looking at the direction of the relationship between social skills and academic achievement, studies show that social skills are positively predictive of concurrent academic achievement (Malecki & Elliot, 2002). The findings of a longitudinal study by Welsh and colleagues (2001) also suggest that there is a reciprocal relationship between social and academic skills. They found that academic achievement exerted a significant influence on social skills from first to third grade and social skills in grade 2 had a significant influence on academic success in grade 3. This study further found that low academic achievement levels in first grade led to less developed social skills in later grades. However, the obverse

did not apply; low social skills did not hinder academic achievement.

In conclusion, pupils' achievement and social skills are related to their social status. Pupils with low academic achievement levels and a lack of social skills are more likely to be socially rejected, whereas high achieving and socially skilled pupils are more likely to be accepted in the peer group. This relationship puts pupils with low academic achievement in mainstream classrooms particularly at risk of being rejected by their peers. However, the results of a previous study on the same sample suggest that the relationship between social skills and social status might be different for pupils with ID (Garrote, 2017).

The study

This study compared the social skills and social status of three groups of pupils enrolled in inclusive classrooms: Pupils diagnosed with ID with poor mathematical achievement ($MATH^{ID}$), pupils with low mathematical achievement ($MATH^{LOW}$), and pupils with high mathematical achievement ($MATH^{HIGH}$). Mathematical achievement was used as a measure of academic achievement. While the literature review suggests that a pupil's academic achievement and social skills should predict their social status, to the best of our knowledge, the relationship between these variables has not been investigated in a comprehensive study in inclusive classrooms with pupils with ID. Studies that include pupils with ID are of interest because the disability results in lower levels of academic achievement which in turn makes pupils with ID more likely to be rejected by their peers, affording them fewer opportunities for developing social skills through peer interactions. To better understand the complex relationship between achievement level and social status, pupils with ID were compared with pupils with low achievement without an ID diagnosis. A group of pupils with high

mathematical achievement was added to the analyses because the investigation of extreme groups can increase the power for detecting associations and relationships (Preacher, 2015). Considering the achievement level as a factor in the analyses substantially expands the knowledge gained in the previous study with the same study sample (Garrote, 2017). The following research questions were investigated:

Research question (RQ) 1: To what extent do pupils with different achievement levels in mathematics ($MATH^{HIGH}$, $MATH^{LOW}$, $MATH^{ID}$) differ in their prosocial behavior and cooperative behavior and their degree of acceptance and rejection?

We hypothesized that pupils in group $MATH^{ID}$ would be less accepted and more often rejected than their classmates in groups $MATH^{LOW}$ and $MATH^{HIGH}$ (H1.1), and that pupils in group $MATH^{HIGH}$ would be more accepted and less rejected than pupils in group $MATH^{LOW}$ (H1.2). In addition, we expected to find that pupils in group $MATH^{ID}$ would display lower levels of prosocial and cooperative behavior than pupils in groups $MATH^{LOW}$ and $MATH^{HIGH}$ (H1.3), and that pupils in group $MATH^{HIGH}$ would be perceived as more prosocial and cooperative than pupils in group $MATH^{LOW}$ (H1.4).

Research question (RQ) 2: Is there a difference between the groups ($MATH^{HIGH}$, $MATH^{LOW}$, $MATH^{ID}$) in terms of the relationship between cooperative behavior and prosocial behavior and rejection and acceptance?

The literature review suggested that the strongest correlation between social skills and acceptance would be found in group $MATH^{HIGH}$ (e.g., Nowicki, 2003; Walker & Nabuzoka, 2007), where both the level of mathematics achievement and social skills were high (according to H1.3 and H1.4), (H2.1). The strongest relationship between social skills and rejection would be expected in groups $MATH^{LOW}$ and $MATH^{ID}$, where the level of academic achievement and social skills were assumed to be low (according to H1.3 and H1.4), (H2.2.). However, based on

the results of a previous study with the same sample (Garrote, 2017), we expected to find that the relationship between social skills and rejection would be weaker for group $MATH^{ID}$ than for group $MATH^{LOW}$ (H2.3).

Method

This cross-sectional study was carried out with pupils in Grades 1 to 3 in the first months of the school year. Mathematical achievement was tested at the beginning of the school year (August/September). Social status and social skills were assessed two months later (October/November).

Participants

Participants in the study were selected from a population of 569 mainstream pupils and 39 pupils with ID enrolled in 37 inclusive grade 1 to 3 classrooms in Switzerland (age in years, $Min = 5.11$, $Max = 10.1$, $M = 8.3$, $SD = 0.74$). The pupils with ID had been diagnosed by a school psychologist prior to the start of the study and at least one pupil with ID was enrolled in each class. Ten classes were attended by first-, second- and/or third-graders, 19 classes were attended by second-graders only, and eight classes by third-graders only. All teachers and pupils took part voluntarily; written parental consent was obtained for all participating pupils.

In the previous study with the same study sample, social skills and social status of pupils with and without ID were analyzed (Garrote, 2017). In the present study, the mathematical achievement level was taken into account. In order to compare pupils with different mathematical achievement levels, the following groups were formed (see criteria below) after collecting data on the whole sample: pupils diagnosed with ID and basic mathematical skills ($MATH^{ID}$, $n = 39$), pupils with low mathematical achievement ($MATH^{LOW}$, $n = 71$), and pupils with high mathematical achievement ($MATH^{HIGH}$, $n = 81$) (Table 1).

Measures

To measure social status and social skills, all of the participating pupils were interviewed individually by a trained test administrator in a quiet room. The interview lasted 10 minutes, on average.

Social status was assessed by asking pupils to rate how much they liked to play with each classmate on a five-point-scale with smileys (5 = ☺ = "I like to play with X a lot"; 1 = ☹ = "I do not like to play with X at all."). The highest ratings (5) and lowest ratings (1) each pupil received from classmates were counted and divided by the number of participants in the class. The individual sum of highest ratings received represents the acceptance of a pupil in the classroom. The pupils received between 0 and 20 highest ratings ($M = 5.75$, $SD = 3.16$). The sum of lowest ratings received represents the social rejection of a pupil. Pupils received between 0 and 14 lowest ratings ($M = 2.11$, $SD = 2.09$). The acceptance and rejection scores were first standardized by dividing the sums of the ratings of each pupil by the number of participants in the classroom. The resulting scores were z-standardized within each class.

Social skills were assessed by asking pupils to rate how well they could work with four classmates (cooperative behavior) and how helpful these classmates were (prosocial behavior) using a five-point-scale with smileys (5 = very cooperative/helpful; 1 = not helpful/cooperative). The four classmates were randomly chosen by the test administrator so that each pupil was also rated by four classmates. An average score for cooperative behavior ($Min = 3.3$, $Max = 4.4$, $M = 3.76$, $SD = 0.80$) and an average score for prosocial behavior was calculated for each pupil ($Min = 3.1$, $Max = 4.7$, $M = 3.70$, $SD = 0.82$). The acceptance and rejection scores were z-standardized within each class.

The mathematical achievement of the mainstream pupils in grade 3 was assessed using the standardized BASIS-MATH-G3+

test (Moser Opitz et al., 2019), which comprises 28 items ($n = 135$, Cronbach's Alpha = .84). In grade 2, the BASIS-MATH-G2+ test (Moser Opitz et al., 2020) was used (25 items, $n = 356$, Cronbach's Alpha = .90). A researcher developed instrument was used for grade 1 as there was no standardized test with norms for Switzerland available. It included 31 items ($n = 78$, Cronbach's Alpha = .87) on the topics of counting objects, comparing numbers up to 20, number sequence up to 20, number decomposition, addition with pictures and coins, formal addition, and formal subtraction. The math scores were z-standardized for each test and for each grade.

The mathematical achievement of pupils with ID ($n = 39$) was assessed individually, using TEDI-MATH (Kaufmann et al. 2009), which is also suitable for assessing pupils with ID (Garrote et al., 2015). The test covers basic topics such as verbal counting up to 20, reading numbers, and comparing numbers. Subtests that required a high level of language competence (e.g., detecting language related errors in number words) were omitted. The Cronbach's Alpha across the 95 items (maximum score 98) was .97. The mathematical achievement level was very heterogeneous ($Min = 1$, $Max = 92$) with an average mean score of $M = 41.46$ ($SD = 23.92$). These math-scores were also z-standardized.

The IQ scores of the pupils with ID were retrieved from their school records. If they were unavailable, pupils were asked to complete CFT 1-R (Weiß & Osterland 2013) or SON-R (Tellegen et al., 2007). The average IQ of the pupils with ID was 61.36 ($SD = 8.68$).

Sampling

The members of groups MATH^{HIGH} and MATH^{LOW} were selected using the results of mathematical achievement tests. Pupils in the 10th percentile rank in the math achievement test were assigned to the group MATH^{LOW} (grade 1: $n = 6$; grade 2: $n = 47$; grade 3: $n = 18$). Pupils in the 90th percen-

tile rank were assigned to group MATH^{HIGH} (grade 1: $n = 10$; grade 2: $n = 57$; grade 3: $n = 14$). Due to the small sample of first graders in this study, it was not possible to derive a test norm for this group. The cut-off scores for percentile rank (≤ 10 ; ≥ 90) were drawn from the results of a large sample of first graders ($n = 1273$) in another (unpublished) study conducted by the research group.

Group MATH^{ID} consisted of $n = 39$ pupils who had been diagnosed with ID by a school psychologist prior to the study. The IQ of all of these pupils was below 75 and their mathematical achievement level was very low compared to their peers without ID. One fifth of the pupils knew some numbers up to 10. Almost half of the pupils linked quantities and numbers, of which half could solve simple addition and subtraction problems. Most of these pupils had an unclear etiology. Six of the 39 pupils had Down syndrome, three had a diagnosed autism spectrum disorder, and 15 pupils had nonspecific behavioral disorders. Table 1 gives an overview of the descriptive characteristics of the groups.

Analyses

Mean, standard deviation, and correlation values were calculated for each of the selected variables (z-standardized-scores): mathematics achievement, social skills (prosocial behavior and cooperative behavior), acceptance, and rejection. In order to test the first hypothesis and to answer RQ 1 (differences in social skills and social status between pupils with different mathematics achievement levels), an a priori contrast analysis was conducted.

To answer RQ 2 and investigate the hypotheses proposed, a series of structural equation modelling (SEM) analyses were conducted in Mplus version 7 (Muthén & Muthén, 2015). Structural equation modeling requires a multivariate normal distribution (Byrne, 2012). Most variables had acceptable distributional properties with appropriate skewness and kurtosis. Only the variable rejection had a skew value bigger than $|0.5|$, which is an indicator for a non-normal distribution (Lienert & Raatz, 1998). The models were therefore evaluated with standard maximum likelihood (ML) and ML estimation with robust standard errors (MLR). To compare the impact of prosocial behavior and cooperative behavior on acceptance and rejection as well as any correlation between the three groups, the models for each group were estimated without applying any equality constraints. These were saturated models where every path possible was estimated: the path from prosocial and cooperative behavior to acceptance and rejection, and the correlation between the social skills variable and the social status variable. In a further step, the paths and correlations of the models of two groups in each case were compared with the χ^2 difference test using the Satorra-Bentler scaled χ^2 test. The saturated model without restrictions was compared to the restricted model, where one path or correlation was set equal for two groups. The result of the χ^2 difference test reveals if there are significant differences in strength of the paths or the correlations between two groups.

Table 1: Descriptive characteristics of the sample groups

Achievement group	<i>n</i>	Male / Female	Age (months) <i>M (SD)</i>	Math achievement <i>M (SD)</i>
MATH ^{HIGH}	81	41 / 40	94.49 (7.83)	0.94 (0.53)
MATH ^{LOW}	71	29 / 42	94.27 (9.95)	-1.47 (0.72)
MATH ^{ID}	39	22 / 17	102.97 (8.64)	0.00 (1.00)

Results

Descriptives

Table 2 provides a summary of the means and standard deviations of the study variables for each of the groups. Group MATH-HIGH had the highest mean prosocial behavior, cooperative behavior, and acceptance. Group MATH^{ID} had the highest mean rejection.

Differences between pupils with different mathematical achievement levels (RQ 1)

An a priori contrast analysis revealed that the acceptance, cooperative behavior, and prosocial behavior scores differed significantly between the three groups (Table 3). The rejection scores of group MATH^{ID} were significantly higher than the scores of the two other groups and the acceptance scores of group MATH^{ID} were significantly lower than those of group MATH-HIGH, but not significantly lower than the scores of group MATH-LOW. Although the difference in acceptance between MATH^{ID} and MATH-LOW was almost significant, H1.1 was only partially confirmed because group MATH^{ID} was not perceived as less accepted than group MATH-LOW. Hypothesis 1.2 was partially confirmed by the analysis. The pupils of group MATH-LOW were less accepted than the pupils of group MATH-HIGH but there was no significant difference between the rejection scores of groups MATH-LOW and MATH-HIGH.

Pupils in group MATH^{ID} were perceived as being less prosocial and cooperative than pupils in groups MATH-LOW and MATH-HIGH. Thus, H1.3 was confirmed. Pupils in group MATH-HIGH were perceived to be more prosocial and cooperative than pupils in group MATH-LOW, confirming H1.4.

The relationships between mathematical achievement, prosocial behavior, cooperative behavior, acceptance, and rejection (RQ 2)

To describe differences in the relationships between mathematical achievement, prosocial behavior, cooperative behavior, acceptance and rejection, the correlations for the three groups are presented in Tables 4–6. The strength of each correlation was interpreted using the effect-size parameters of Cohen (1969). The results indicate that prosocial behavior, cooperative behavior, and acceptance are correlated in all of the groups. However, the strength of the correlation differed.

In group MATH-HIGH, no significant correlation was found between rejection and the social skills variables. Mathematical achievement showed a weak correlation with prosocial behavior and cooperative behavior for group MATH-HIGH (Table 4). There was a moderate correlation between acceptance and rejection and between prosocial behavior and cooperative behavior variables in this group. The strongest correlation between rejection and acceptance and between prosocial and cooperative behavior was found in group MATH-LOW (Table 5). In addition, the higher the perceived

Table 2: Means and standard deviations of the social skills and social status variables for each group

	MATH ^{HIGH} n = 81 M (SD)	MATH ^{LOW} n = 71 M (SD)	MATH ^{ID} n = 39 M (SD)
Prosocial behavior	0.38 (0.92)	-0.18 (0.89)	-0.79 (0.87)
Cooperative behavior	0.37 (0.87)	-0.24 (0.87)	-0.64 (0.92)
Acceptance	0.29 (0.93)	-0.37 (0.96)	-0.73 (0.89)
Rejection	-0.17 (0.82)	0.10 (0.98)	0.64 (1.09)

Table 3: *A priori contrasts between the groups*

	MATH ^{HIGH} vs. MATH ^{LOW}			MATH ^{HIGH} vs. MATH ^{ID}			MATH ^{LOW} vs. MATH ^{ID}		
	<i>M</i> _{Diff}	<i>SE</i>	<i>p</i>	<i>M</i> _{Diff}	<i>SE</i>	<i>p</i>	<i>M</i> _{Diff}	<i>SE</i>	<i>p</i>
Prosocial behavior	-0.56	0.15	< .001	-1.16	0.18	< .001	-0.60	0.18	< .001
Cooperative behavior	-0.62	0.14	< .001	-1.05	0.17	< .001	-0.44	0.18	.014
Acceptance	-0.65	0.15	< .001	-1.03	0.18	< .001	-0.37	0.19	.050
Rejection	0.27	0.15	.087	0.80	0.18	< .001	0.54	0.18	.005

Note. *df* = 188; *M*_{Diff} = Differences between the means of the groups.

Table 4: *Correlation between variables measured for group MATH^{HIGH}*

	Math achievement	Acceptance	Rejection	Prosocial behavior
Acceptance	.189			
Rejection	.042	-.361***		
Prosocial behavior	.274*	.409***	-.106	
Cooperative behavior	.291*	.495***	-.141	.633***

Note. *n* = 81; *** *p* < .001, ** *p* < .01, * *p* < .05.

Table 5: *Correlation between variables for group MATH^{LOW}*

	Math achievement	Acceptance	Rejection	Prosocial behavior
Acceptance	.140			
Rejection	-.032	-.594***		
Prosocial behavior	.177	.556***	-.436***	
Cooperative behavior	.161	.524***	-.606***	.708***

Note. *n* = 71; *** *p* < .001, ** *p* < .01, * *p* < .05.

social skills, the more accepted and less rejected low achieving pupils were.

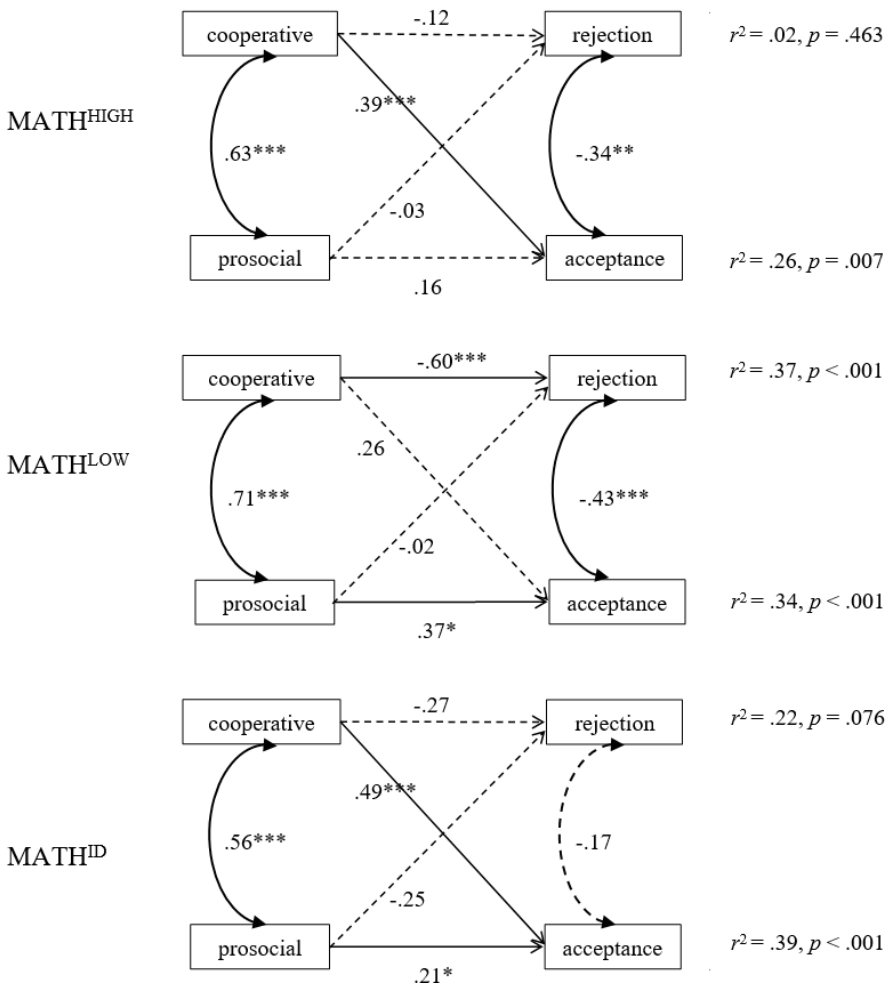
In group MATH^{ID} (Table 6) there was a strong correlation between acceptance and cooperative behavior. The correlations are comparable to those of group MATH^{LOW} (Table 5). The correlations between rejection and acceptance and rejection and prosocial as well as cooperative behavior in group MATH^{ID} were weaker than those for group

MATH^{LOW}. This was especially true for the correlation between cooperative behavior and rejection. The weak (MATH^{HIGH}) or non significant (MATH^{LOW} and MATH^{ID}) correlation between mathematical achievement and the other variables can be explained by the sampling procedure. The groups were formed based on mathematical achievement so the variance of the mathematical achievement variable was low.

Table 6: Correlation between variables for group MATH^{ID}

	Math achievement	Acceptance	Rejection	Prosocial behavior
Acceptance	-.259	—		
Rejection	.256	-.403*	—	
Prosocial behavior	-.030	.476***	-.406**	—
Cooperative behavior	-.007	.601***	-.415**	.556***

Note. $n = 39$; *** $p < .001$, ** $p < .01$, * $p < .05$.



Note. Path coefficients and correlations are standardized. Dashed lines indicate a nonsignificant path. Curved arrows represent correlations. *** $p < .001$; ** $p < .01$; * $p < .05$.

Figure 1. Impact of cooperative behavior and prosocial behavior on rejection and acceptance for each sample group (MATH^{HIGH}, MATH^{LOW}, and MATH^{ID})

In order to investigate if the relationship between social skills and social status differs between the groups with different achievement levels, saturated models were estimated for each group, $MATH^{HIGH}$, $MATH^{LOW}$ and $MATH^{ID}$. In addition, between-group χ^2 difference tests for each path for comparing the groups were calculated. Figure 1 shows the models for the different groups.

The models in Figure 1 show that the paths and correlations in the three models are different. However, the χ^2 difference test results reveal that only one path was significantly different between groups: Cooperative behavior had a significantly stronger negative correlation with rejection in group $MATH^{LOW}$ than in group $MATH^{HIGH}$ ($\Delta\chi^2 = 10.02$, $\Delta df = 1$, $p = .002$) and $MATH^{ID}$ ($\Delta\chi^2 = 3.84$, $p = .049$). No relationship between social skills and rejection was found in group $MATH^{ID}$. Thus, the hypothesis that the strongest relationship between social skills and rejection would be in groups $MATH^{LOW}$ and $MATH^{ID}$ was only partly confirmed (H2.2). The hypothesis that the relationship between social skills and rejection would be weaker for group $MATH^{ID}$ than for group $MATH^{LOW}$ (H2.3) was not confirmed due to the missing significant path in group $MATH^{ID}$. The relationship between social skills and acceptance was expected to be stronger in group $MATH^{HIGH}$ than in the other groups (H2.1). However, this hypothesis was not confirmed.

Discussion

This study aimed to investigate the relationships between social skills and social status in primary school pupils with ID enrolled in inclusive classrooms compared with those of their higher and lower achieving mainstream peers.

Social skills and social status in inclusive classrooms

A comparison between pupils with ID and their mainstream peers showed, as expected, that pupils with ID were perceived by peers as having the lowest level of cooperative and prosocial behavior of all the groups. In contrast, high achieving mainstream pupils displayed the highest level of social skills. The ratings of low achieving pupils fell between these two groups. Therefore, the relationship between academic skills and social skills reported in other studies (e.g., Walker & Nabozuka, 2007; Welsh et al., 2001), was confirmed. According to Welsh et al. (2001), over time academic skills facilitate the development of social skills. Thus, it can be assumed that pupils who do well academically are more likely to develop cooperative and prosocial skills that are perceptible to their peers. At the same time, it is likely that low achieving pupils, both with and without SEN-diagnosis, are unable to develop the same level of social skills as their high achieving peers and therefore require increased support to attain improved prosocial and cooperative skills.

The comparison between the groups in terms of their social status yielded a more complex picture. Pupils with ID and low achieving mainstream pupils did not differ in their acceptance but were both less accepted than high achieving mainstream pupils. The association between academic achievement and acceptance in the peer group is in line with other research on mainstream pupils (e.g., Welsh et al., 2001) and on pupils with LD (Van der Sande et al., 2018; Walker & Nabuzoka, 2007; Welsh et al., 2001). Further, pupils with ID were more rejected than their high achieving peers, a result that confirms other findings (e.g., Huber & Wilbert, 2012). However, while pupils with ID were more rejected than their low achieving mainstream peers, the latter were not more rejected than high achieving pupils. Although these results suggest a relationship between achievement level and

acceptance in favor of high achieving peers, they also highlight that pupils with ID, independent of their achievement level, are significantly more at risk of being rejected than their mainstream peers.

Relationship between social skills and social status

The extent to which the social status – acceptance and rejection – of the achievement groups was affected by their cooperative and prosocial behavior was examined by comparing these relationships across all groups. In line with findings of the previous study with the same study sample (Garrote, 2017), no relationship between social status and a low level of social skills was found for pupils with ID. Thus, it can be assumed that the high level of rejection experienced by pupils with ID was not because of their weaker social skills. In contrast, there was a strong negative association between cooperative behavior and peer rejection for low achieving mainstream pupils, and a small positive association between cooperative behavior and acceptance in high achieving pupils. This suggests that highly cooperative low achievers were able to modulate rejection with their behavior and very cooperative high achieving pupils were more accepted with their peer group. These findings – gained by considering the achievement level of pupils without ID – add new knowledge to the findings of the previous study with the same study sample (Garrote, 2017). They highlight the importance of cooperative behavior for the social experiences of pupils in peer groups. The development of cooperative skills can be fostered with cooperative learning methods which in turn can help promoting social inclusion (Juvonen et al., 2019). However, the positive relationship between cooperative skills and social status does not seem to apply to pupils with ID. The different relationship between peer rejection and social skills in low achievers compared to that of pupils with ID could be a result of peers having

lower expectations of cooperative behavior from classmates with ID than they do of low achieving classmates. In other words, pupils might be aware that their peers with ID have special needs because, for example, they frequently interact with the teacher (Spörer et al., 2021), and therefore have lower expectations of those pupils' social interactions. Jones and Frederickson (2010) assume that the more "typical" the pupils and their behaviors are perceived to be, the fewer special concessions classmates are willing to make. Thus, peers might be less willing to accept the low levels of cooperative behavior of mainstream pupils than of classmates with ID. Nevertheless, pupils with ID were significantly more rejected by their peers than low achieving pupils. It is therefore likely that other factors may play a more important role in the rejection of pupils with ID in inclusive classrooms. Current research shows that factors at the classroom level, such as class norms (Gasser et al., 2018) and teaching behavior in class (Hendrickx et al., 2017), have an impact on pupils' social status. Some classroom level factors seem to particularly affect pupils with SEN. Krawinkel, Südkamp, Lange, and Tröster (2017) found that a positive classroom climate did not modify the rejection levels of pupils in general, but did have a positive impact on reducing the rejection of pupils with SEN. Further, grouping of academically similar pupils (Juvonen et al., 2019) or learning arrangements in which pupils with SEN are frequently separated from their classmates impede social interactions between pupils with SEN and those without (Feldman et al., 2016). Spörer et al. (2021) found that pupils with SEN in co-taught inclusive classrooms interacted less with their classmates and more with their teachers compared to pupils without SEN. Interacting less frequently with peers reduces pupils' opportunities to build relationships and affects their social status in the peer group. Further studies focusing on factors at classroom level, teacher variables, and on learning arrangements in inclusive classrooms are needed in order to

learn more about the predictors of social status of pupils with SEN, in particular the status of pupils with ID enrolled in inclusive classrooms. Finally, the disability label combined with characteristics such as restricted communication, motor skills, or a different physical appearance, might also explain the social rejection of pupils with ID. How much, if any, influence each of these factors has needs further exploration.

Limitations

This study has some limitations. First, when assessing the academic attainment of pupils, only mathematical achievement was considered. Some pupils with low mathematical achievement could be high performers in other subjects. Therefore, to disentangle the relationship between academic achievement and social status, studies should look at academic achievement across more subjects. Second, the study groups, especially the group of pupils with ID, were small, and the heterogeneity of the pupils with ID (e.g., different syndromes, different communication skills, different appearances) might have affected the results. However, as the population of inclusive classes that contain pupils with ID is small and classes with more than one pupil with ID are scarce, the sample size is satisfactory. Third, the evaluation of social skills was entirely based on peer perception and not confirmed by other respondents, such as teachers or parents. However, collecting data from peers can also be regarded as a strength of the study (Cillessen & Marks, 2017). Fourth, saturated models always produce a perfect fit. They are descriptive and assumptions about the direction of paths can only be justified by theoretical considerations and the results of previous research. Fifth, the results of this cross-sectional study must be interpreted with caution. Longitudinal studies, possibly with cross-lagged-panel designs, must be conducted to draw causal conclusions about the relationship between social skill and social status (Oud, 2002).

Conclusion and future directions

The results of this study provide insights into the relationship between mathematics achievement, social skills, and social status in inclusive classrooms, and raise important questions that should be explored in future research. The analyses show that cooperative behavior plays a more important role in determining social status than prosocial behavior, a result which should be taken into consideration when designing future intervention studies. The study also confirmed that pupils with ID have a low level of social skills and are at higher risk of social rejection compared to their mainstream peers. This emphasizes the need for supporting the development of social skills in these pupils. It also highlights the importance of further research that focuses not only on pupils with SEN or ID, but on developing a better general understanding of the mechanisms underlying the social hierarchies in inclusive classrooms. Future research should investigate learning arrangements and teacher-related variables to better understand the processes (e.g., interactions in the classroom, teacher feedback behavior) that foster or hinder social rejection in the peer group.

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